UNITED

Implementing the AIRborne_ InterNET (AIR_NET)

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flightoperations

Flight Standards and Technology

AIRNET Agenda:

- Our programs
  - ‣ NASA's Aviation Weather Information (AWIN) Trials
  - ‣ FAA's Safe Flight – 21 Trials
  - ‣ DOT's Rapid Response Team Cabin Surveillance Trials
- AIR_NET components
- Moving Forward

Why implement AIR_NET with the Electronic Flight Bag?

- ALL of our data is now available electronically
- Better weather – cheaper
- Security bonus of surveillance
- Throw-away avionics
- Business and partnership opportunities
- UAL's R/D funded by other projects
- Manpower reductions
- Jepp/LIDO/NOAA with electronic charting offerings
- Runway awareness/incursion device
- United's Skynet will be virtual EFB outside of aircraft.
- Best practice
- Eliminate printing/distribution costs
- Extensive maintenance/onboard applications
- Passenger offerings now available with JetConnect-type wireless server
- Bonus potential of live entertainment to aircraft

// U N I T E D

NASA/UAL AWIN Flight Trials on A320 – 60 Leg ISE

Airfone Datalink - Graphical Weather on WINN Display

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Live Weather with Datalink

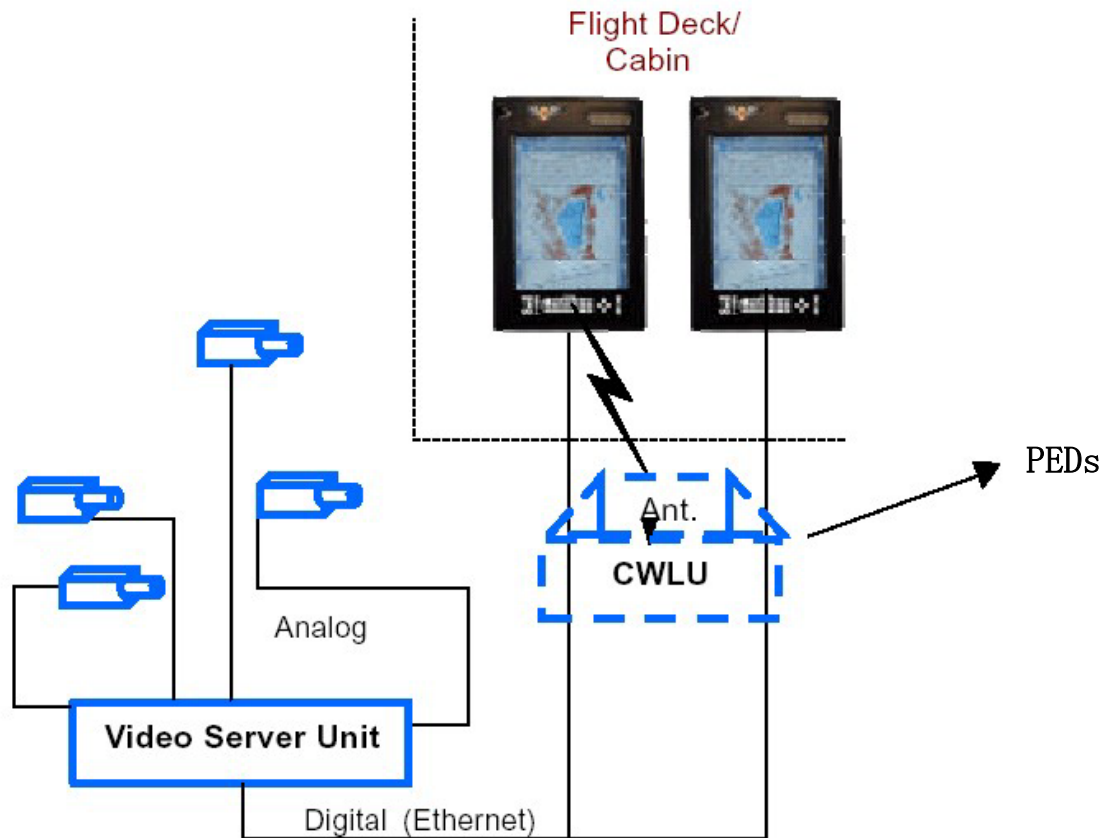**UNITED**

OEP AD-4 Enhanced All-WX Surface Ops

**Final Approach, Runway and
Taxiway Occupancy Awareness**

UAL Surface Moving Map Test

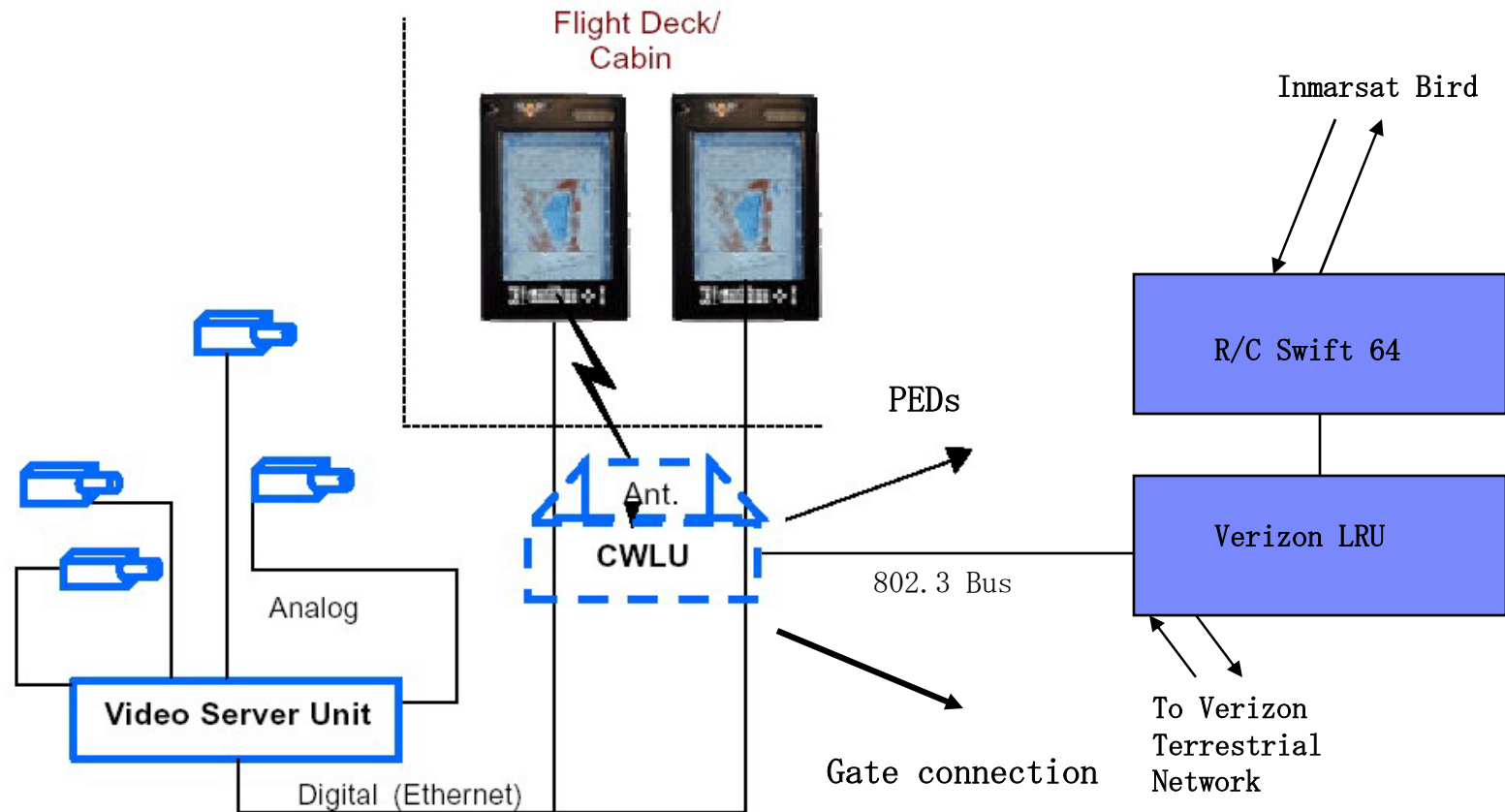# B747-400 Cabin Surveillance Phase 1 Evaluation System

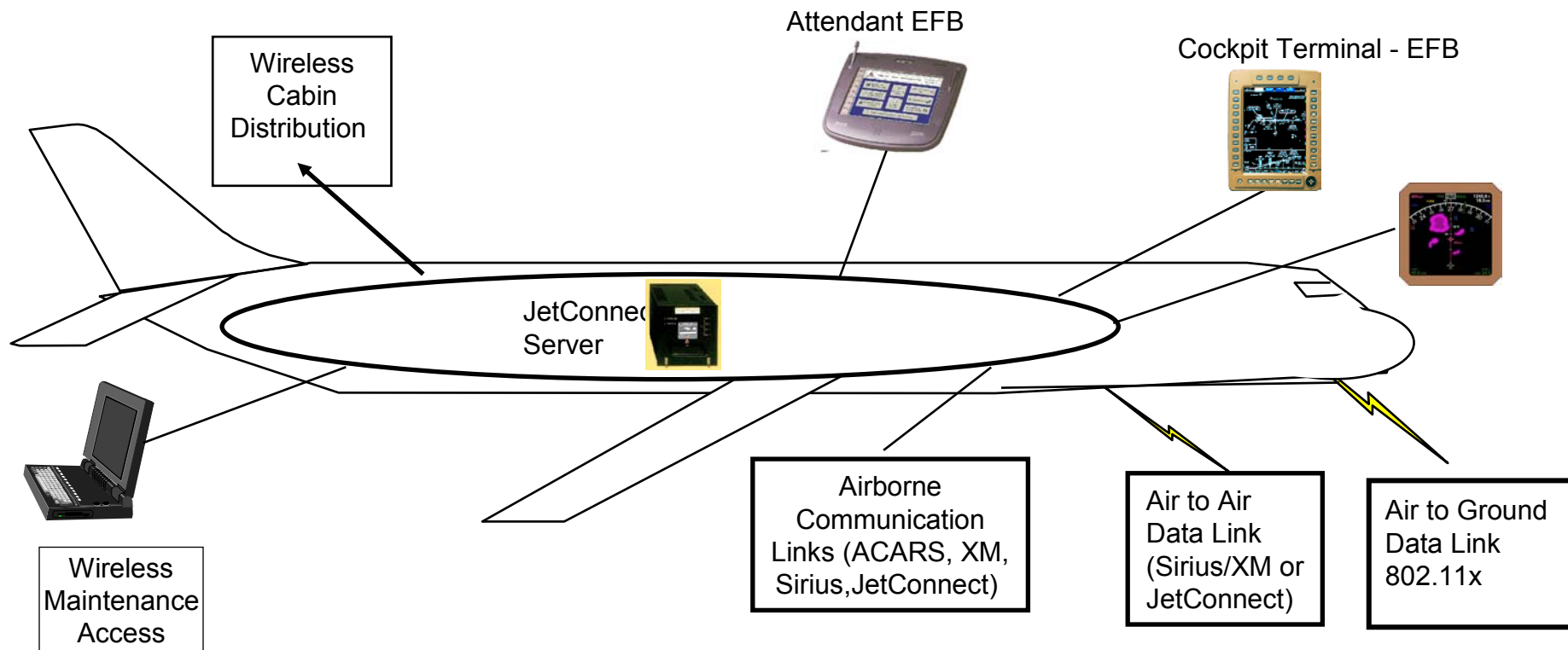# Cabin Surveillance Phase 1 - FO Display Mounting Position

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Cabin Surveillance Phase 1 - Wireless Portable Display

B747-400 Cabin Surveillance Phase 2 Evaluation System

Attendant EFB

Cockpit Terminal - EFB

Wireless Cabin Distribution

JetConnect Server

Wireless Maintenance Access

Airborne Communication Links (ACARS, XM, Sirius,JetConnect)

Air to Air Data Link (Sirius/XM or JetConnect)

Air to Ground Data Link 802.11x

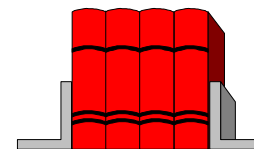## Typical Applications and Services

Flight Ops
- Weather
- Electronic Manuals/Charts
- Cabin Surveillance
- Surface Moving Maps
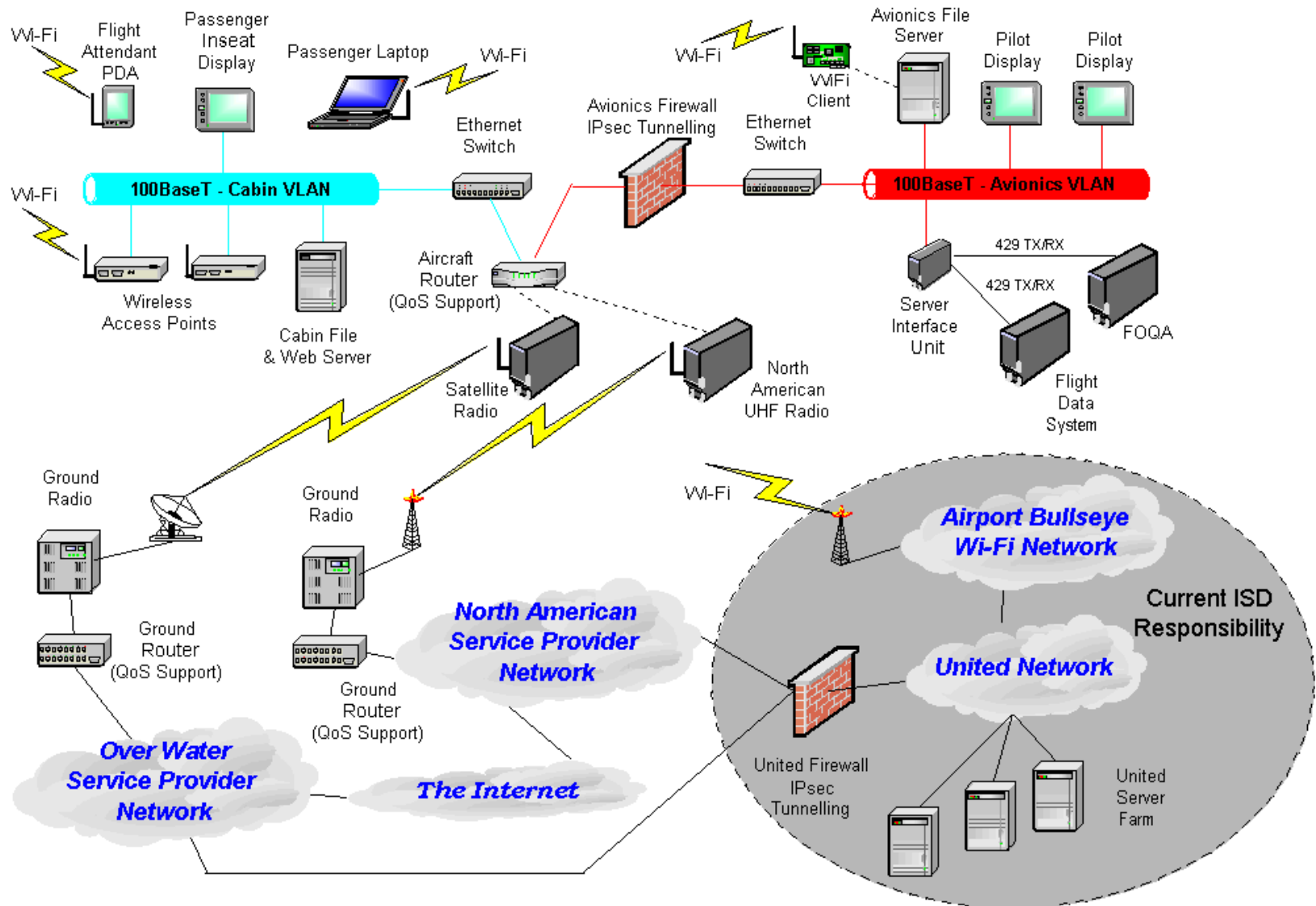- Flight Papers/Data

Onboard/Passenger
- Rebooking/IRROPS
- Customer Profiles
- Buy On Board
- Live Audio
- Email/WAP Browsing

Maintenance
- *FIX
- Flight Data Downloads
- Electronic Logbook
- Maintenance Data Collection
- Electronic MEL

Air_Net Architecture

AirNet – Phase 1

Phase 1 Scope

First fleet only.

EFBs, charts and manuals as planned.

Commodity weather data.

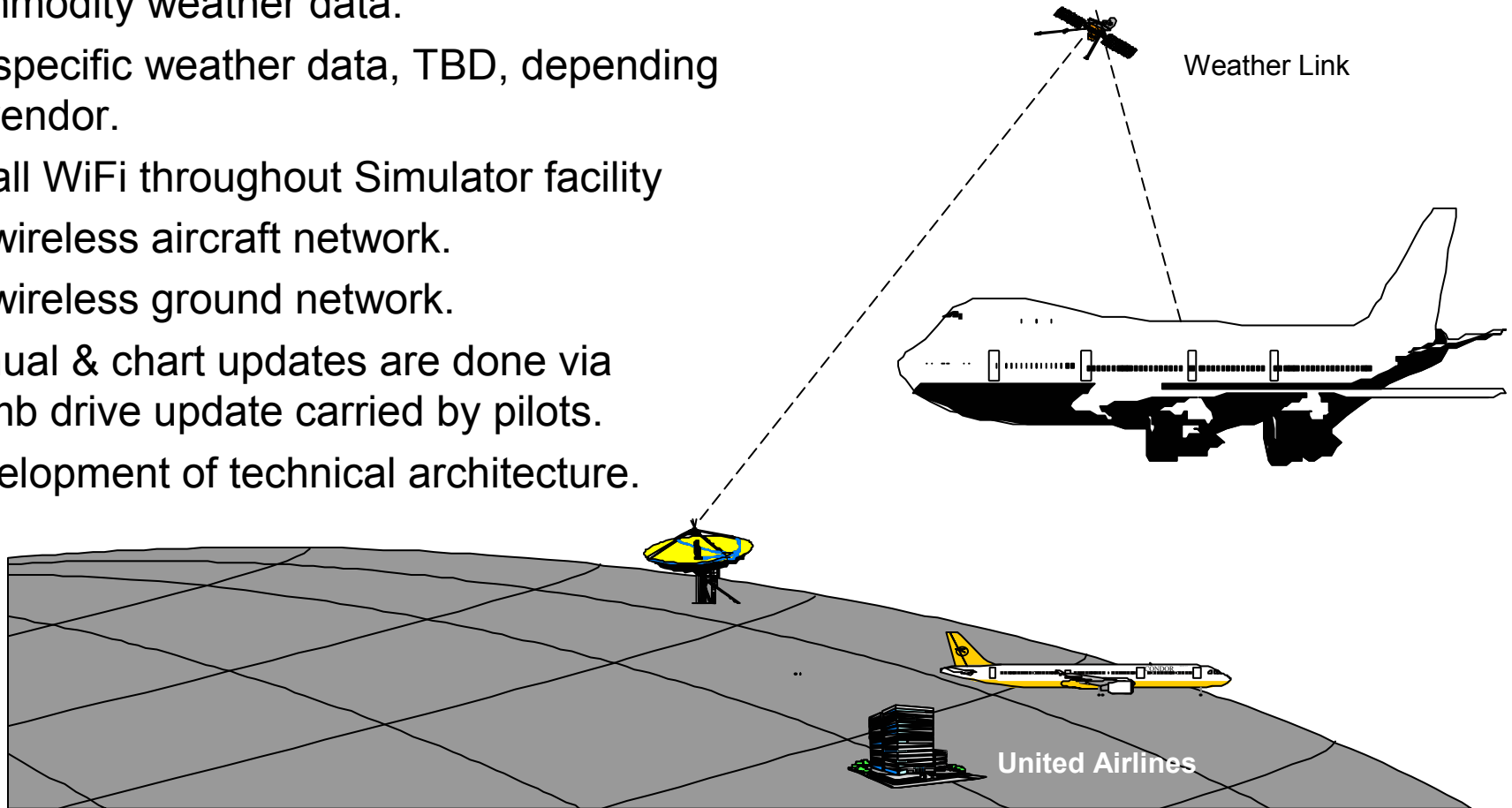UA specific weather data, TBD, depending on vendor.

Install WiFi throughout Simulator facility

No wireless aircraft network.

No wireless ground network.

Manual & chart updates are done via thumb drive update carried by pilots.

Development of technical architecture.

Weather Link

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AirNet – Phase 2

Phase 2 Scope

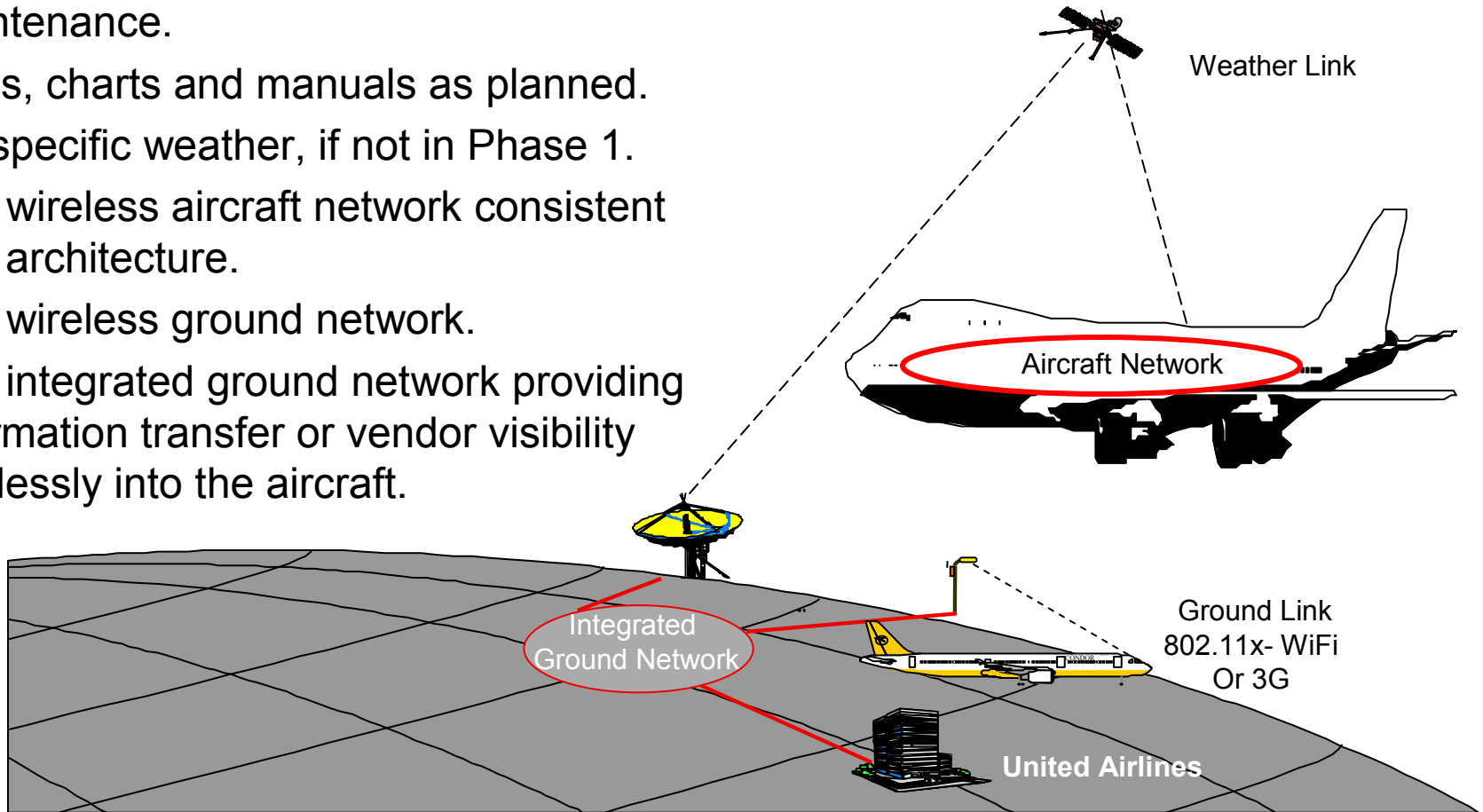Deploy on all remaining fleets. Upgrade the first fleet during regularly scheduled maintenance.

EFBs, charts and manuals as planned.

UA specific weather, if not in Phase 1.

Add wireless aircraft network consistent with architecture.

Add wireless ground network.

Add integrated ground network providing information transfer or vendor visibility wirelessly into the aircraft.

Weather Link

Aircraft Network

Integrated Ground Network

Ground Link
802.11x- WiFi
Or 3G

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AIR_NET Block components

System components (per aircraft):

- two flat panel, touch screen computers in Flight Deck (EFB)
  - ‣ articulating mount with 10baseT (802.3) and 28v dc
- EFB for F/A
- 802.11x Wireless Access Point and router
- Weather receiver system
- 10baseT (802.3) homerun to JetConnect server
- ARINC 429-10baseT read only connection
- available port for door camera provisions

All components are FAA approved (TSO, STC, AC120-76)

Making the numbers:
## AIR_NET with Electronic Flight Bag Savings considerations

- Enroute convective reroute reduction – fuel and block time
- Fuel Savings from elimination of Flight Bag Weight
- Communications savings from transactional-based data reduction
- Elimination of paper distribution
- Maintenance electronic updates vs. manual loading
- Back Injury reduction from Flight Bags carriage
- Charting savings for paperless
- Reduction of turbulence injuries due to graphical CAT display
- Digital FOM and AFM – no printing
- Gate link of FOQA and DFDR data
- Reduction of runway incursions due to surface moving map – future
- FAA OEP element AW-2 Increase approach arrivals - future
- Enhanced Situational Awareness – priceless!

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FO Applications - Weather Information Network (WINN)

SIGMET, METARS, TAF, and airport ATIS information may be displayed in a graphic format and in text

The FMC's flight plan route is automatically displayed

Data is displayed in a "North up" format or in a "Track up" format
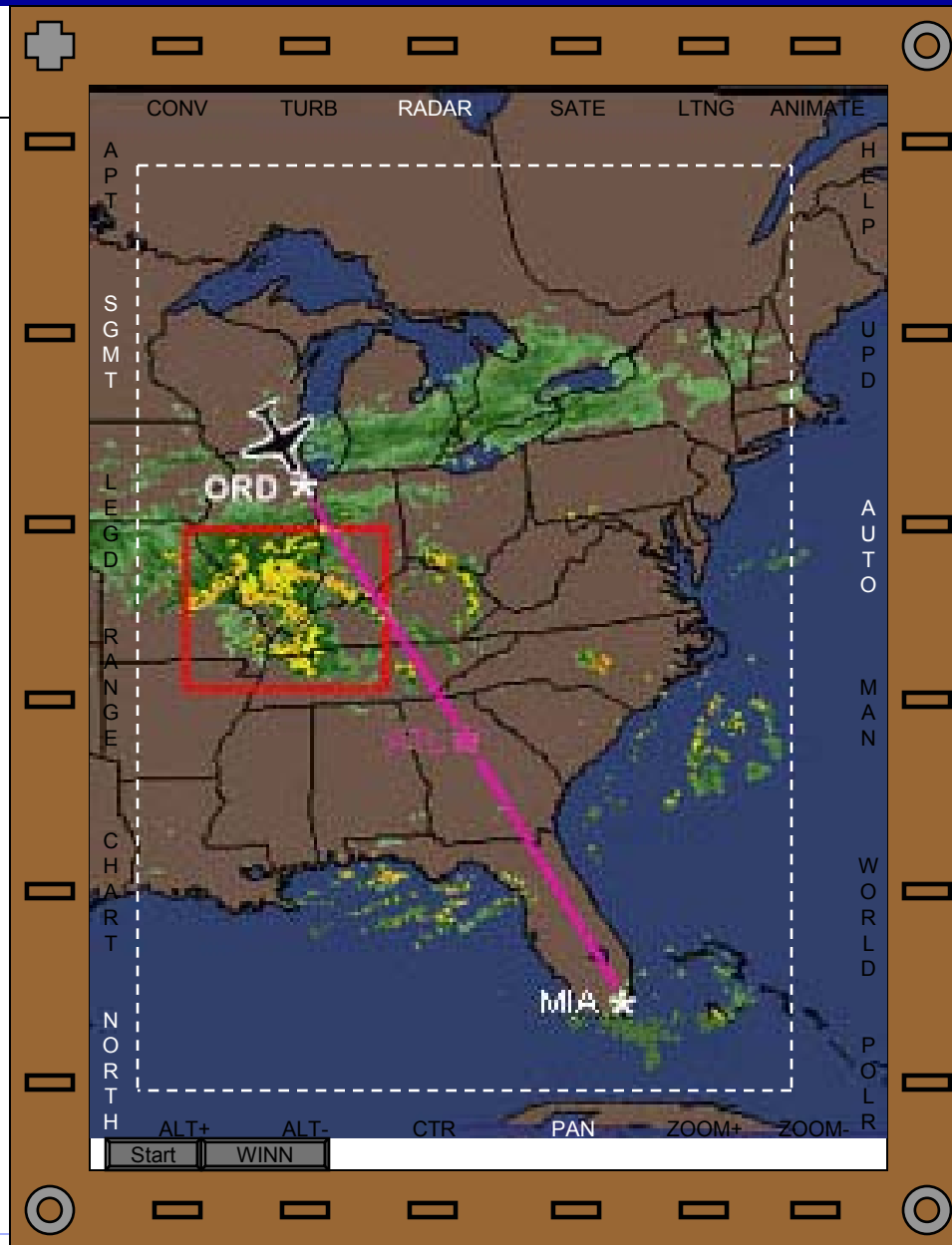
Convective, Volcanic Ash, Turbulence, Winds, Icing, Radar (conus only), Satellite, Lightning, and "Now casting" weather data are available world wide via automatic data link

Provides quality information for making better decisions

Enhances pilots' situational awareness

The WINN program automatically centers and tracks the aircraft's location or by manually panning to any location

Approach Plates

Origin airport tabs are displayed on the left side of document

The FMC's current flight plan route is displayed on to High, Low, Area, Departure, and Arrival charts

Waypoint functionality on charts is the same as on the Navigation Display

Emergency escape route documents for high terrain areas are available (E RTE)

JeppView interfaces with the FMC to select origin and destination airports' SID, STAR, runway data, emergency engine out procedures ("T Pro"), airport, and approach charts

Aircraft's printer provides copies of selected chart

Find and Help functions provide access to legend and glossary information

Questions?
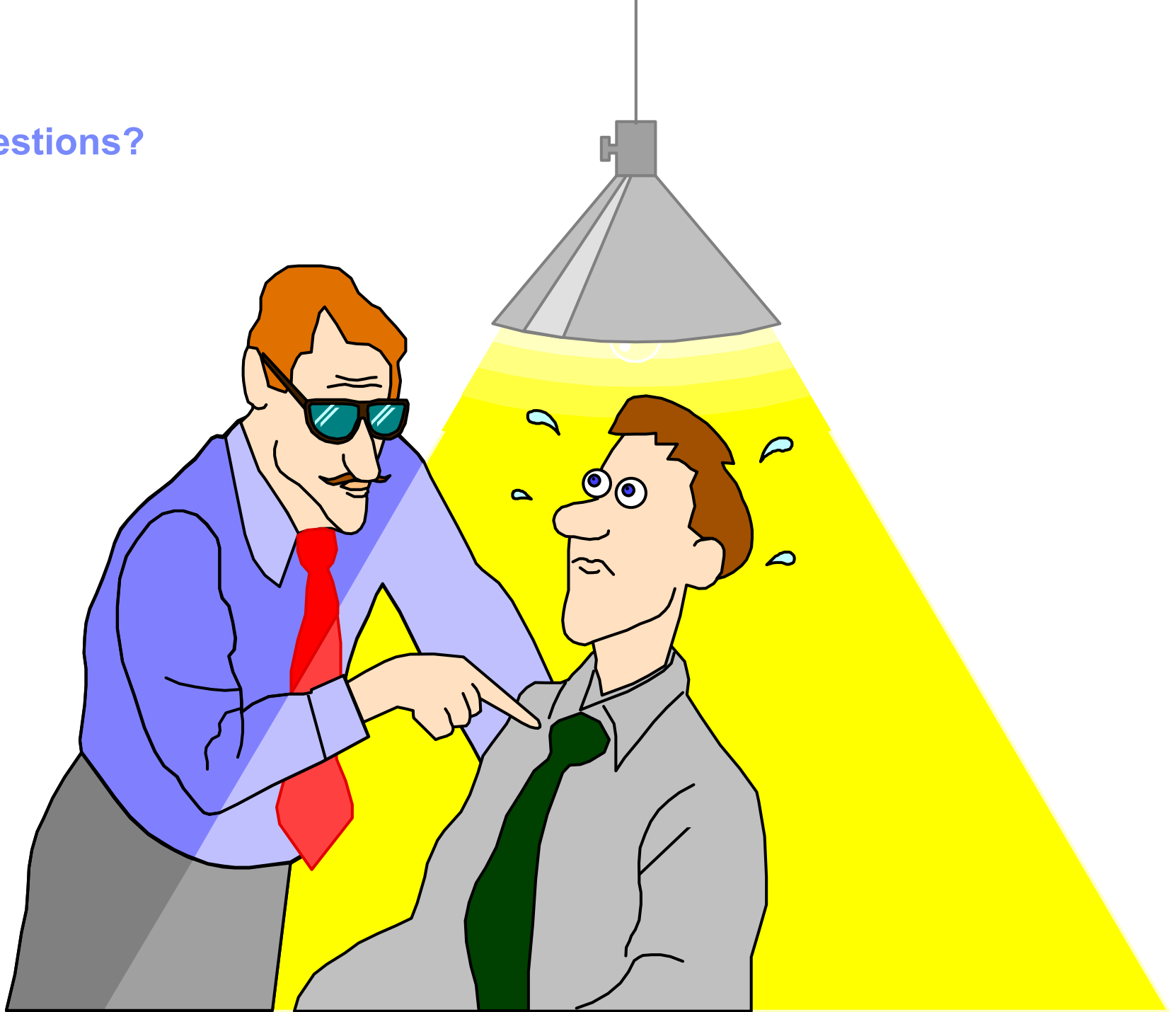
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